FIVE-YEAR GOALS

TECHNOLOGY APPLICATION CENTER

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Technology Application Center
The University of New Mexico
Albuquerque, New Mexico

SUMMARY

The primary emphasis of the five-year goals of the Technology Application Center will be to expand and improve the three basic programs of the Center. The Regular Dissemination Program will continue to be the major program of the Center. The Small-Business Program will continue to develop effective means for the transfer of technology to small firms. The Natural-Resources Program will continue to develop for effective dissemination the special data resulting from specific NASA and other programs of interest to the extractive industries.

Along with the expansion of its basic programs the Technology Application Center will also broaden its cooperation with States Technical Services Act and other technology-transfer programs.

In order to accomplish general program expansion the Technology Application Center plans to improve in several specific operating areas. Its plan for the next five years calls for: development of an improved and more rapid response to client needs; development of a greater breadth and depth of information-base coverage; development of improved communication facilities and referral services; development of an increased cost effectiveness for Center services; increasing the scope of the technical evaluation and summary services available to clients; and, implementing computerized-retrieval services.

TABLE OF CONTENTS

I. Objectives

The Technology Application Center is a NASA Regional Dissemination Center charged with serving fee-paying members by matching their technological needs and problems with the technology included in the NASA and other information bases. The center is a non-profit agency supported by industry, The University of New Mexico, and the government. The Technology Application Center recognizes its major responsibility to be the promotion of the economic growth and the enhancement of the competitive position of industry in the Rocky Mountain States and the Southwest. TAC's primary objective, therefore, is to meet such responsibility by making available to private business all appropriate technology, both traditional and new.

Complementary objectives of the Center include at least six auxiliary goals:

1. establishing programs of transfer of technology which can serve all members of the industrial community--large firms and small, sophisticated and unsophisticated, no matter what their respective technological fields may be;

2. serving other segments of the economy whenever they need and can profit from information on new technology;

3. engaging in research and experimentation in technology transfer in order to gain truer understanding of the process and to devise, develop, and participate in programs, experimental and otherwise, of genuine regional significance;

4. establishing special programs for small businesses and for natural-resources companies because of the predominance of such firms in TAC's specific geographic area;

5. seeking access to new sources of information in order to expand the Center's information base and to prevent its becoming inadequate for regional needs as they become better known; and

6. evaluating new and promising technology for potential regional application and providing stimulation and encouraging support of profitable use of such new techniques by the regional business and industrial communities.

To sum up TAC's guiding aims: The Center will continuously strive to educate business and industry to recognize both their own need of and the true potential value to them of externally generated knowledge.

II. Operational Environment

GEOGRAPHIC

The Technology Application Center is located in the Rocky Mountain-Southwest region and provides a wide range of services to member firms in New Mexico, Arizona, Colorado, Texas and Utah.

The region can be characterized quickly: It is big, but its population is relatively small; and the distances between and among the centers of TAC's client concentrations are great. More than 90 per cent of TAC's member firms are in the region's largest cities. The other 10 per cent is widely scattered. Such characteristics mean high marketing costs to TAC in time and in transportation dollars. But the Center takes such handicaps in stride, considering them only part of the overall challenge.

ECONOMIC AND INDUSTRIAL

The growth indicators listed in Table 1 show that during the first half of this decade New Mexico (the "home state" of TAC) could not keep pace with the growth rates in the United States or in its bordering states. Table 2 shows that New Mexico's per-capita income is both the lowest in the region and only 80 per cent of the national figure. In 1959 it was 89 per cent of the latter.

TABLE 1

ECONOMIC GROWTH IN THE U.S. AND FIVE WESTERN STATES
AS SHOWN BY THREE MAJOR ECONOMIC MEASURES
(1960-1965)
(in percentages)

	U.S.	New Mexico	Arizona	Colorado	Texas	Utah
Population	8.1	6.7	20.9	11.1	10.6	11.6
Employment*	12.1	10.8	20.3	13.7	15.1	13.5
Personal Income	33.5	23.5	39.1	31.3	33.6	32.2

*nonagricultural

Sources: Derived from reports of the U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 348; U.S. Department of Labor, Bulletin 1370-3, Employment and Earnings Statistics for States and Areas, 1939-1965; U.S. Department of Commerce, Survey of Current Business, August 1966

TABLE 2

POPULATION AND INCOME FOR THE U.S. AND FIVE WESTERN STATES
1965

	Population	Personal Income (in millions)	Participation Income (in millions)	Per-Capita Income
U.S.	193,795,000	$532,147	$419,085	$2,746
New Mexico	1,014,000	2,224	1,725	2,193
Arizona	1,575,000	3,733	2,866	2,370
Colorado	1,949,000	5,282	4,070	2,710
Texas	10,591,000	24,761	18,933	2,338
Utah	994,000	2,341	1,902	2,355

Sources: U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 348; U.S. Department of Commerce, Survey of Current Business, August 1966

TABLE 3

PERCENTAGE DISTRIBUTION OF PARTICIPATION INCOME: U.S. & FIVE WESTERN STATES 1965 (1)

	U. S.	New Mexico	Arizona	Colorado	Texas	Utah
TOTAL (2)	100.0	100.0	100.0	100.0	100.0	100.0
Farms	4.3	6.6	6.9	5.8	6.8	2.8
Mining	1.2	7.6	5.1	2.5	5.0	4.8
Contract Construction	6.2	7.8	6.7	7.6	6.7	6.8
Manufacturing	30.4	6.5	16.4	16.1	20.3	18.3
Trade	17.4	15.8	17.9	19.7	19.8	18.3
FIRE (3)	5.2	4.3	5.9	5.8	5.5	4.3
Transport & Utilities	7.3	7.9	7.1	8.6	8.0	8.8
Services	14.1	19.3	15.8	15.5	13.8	12.7
Government	13.6	24.1	18.0	18.0	13.8	22.8
Other	0.3	0.2	0.3	0.2	0.3	0.3

(1) Includes wages and salaries, other labor income, and proprietor income.
(2) Details may not add to total because of rounding.
(3) Finance, Insurance, and Real Estate
Source: U.S. Department of Commerce, Survey of Current Business, August 1966

The slower rate in New Mexico can perhaps be best explained by considering the ways in which New Mexicans earn their income (Table 3). Obviously, New Mexico relies a great deal more heavily upon mining, government, and services, and much less heavily upon manufacturing than does the nation. This situation is also true of New Mexico vis-a-vis the other states, but to lesser degrees. The paucity of manufacturing activity points out the lack of high-income-creating processing industries in the area.

On the other hand, the overall growth records of New Mexico's neighbors exceeded those of the nation in almost every category (Table 1). We see, for example, that the growth rates of population and employment in all these states easily outstripped the national rate; also, the rate of rise in personal income in Arizona exceeded the national rate by a large margin. Personal income in the other three states grew at about the U.S. rate. Had these states been less dependent upon extractive industries, personal income undoubtedly would have increased at even greater rates. Even so, manufacturing plays an important role in the economy of each of these states (Table 3) and contributes more to participation income in Texas than does any other sector.

In summary, the economic environment provides both a challenge and an obligation for the Center. In New Mexico, the Center must continue to assist in the establishment of an industrial base. In the other states of the region, the Center must develop the ability to meet the needs of a rapidly expanding industrial economy.

TECHNOLOGICAL

The region's technical competence is rather easily measured and classified. Not surprisingly, the chemical, the geological, the nuclear, and the electronic technologies prevail heavily; yet they constitute only one major portion of the wide range of diverse technologies being engaged in at all levels of sophistication by commercial firms in the five states. So much technical diversification characterising the many embryonic firms sprinkled throughout this vast area constitutes a welcome challenge to TAC. That diversification is also a weathervane of bright promise for the technological and the economic future of the region.

III. Resources

PEOPLE

Among the most outstanding aspects of TAC's technology-transfer efforts is its staff of technical and information specialists, who constitute an impressive resource. The Center employs a multidisciplinary team of engineers and scientists assigned the continuing responsibility of meeting the expressed needs of TAC's clients with materials from NASA's computer-indexed collection of world-wide scientific and technical literature.

Typical members of the technical staff are persons with degrees in science or engineering and with recent industrial experience and a thorough understanding of both the most available sources of information and also the most advanced techniques of identification and retrieval. The staff also receives assistance and support from certain UNM faculty members acting as consultants.

The services of information specialists complement the services of the technical staff. These specialists maintain TAC's technical-information bank, steadily feeding into it the latest appropriate materials like abstracts, announcement journals, microfiche and hard copy reports, journals, reference books, and special articles and bulletins. The information specialists also maintain appropriate industrial accounts and financial records.

EQUIPMENT AND FACILITIES

TAC possesses most of the equipment essential to the conduct of an effective information center. Physical space is suitable, and the engineering

and administrative offices are adequately equipped. Nearby are the information-and-support staff and its growing technical library. A modern computer is now operated in the same building; and current studies seek to define and to develop the software and other operating parameters necessary for efficient use of the computer in storing, searching, retrieving, and printing relevant information. Further improvements and additions are programmed to keep pace with expansion of the information bank and to cope with expected increases in the number of clients and in the use of TAC services.

INFORMATION BASE

Presently, TAC's information resources consist largely of the excellent technical-information bank assembled by NASA: over 250,000 current documents; and the bank acquires more than 50,000 additional documents annually. All entries are so indexed and inventoried as to make possible their rapid and selective retrieval via computer methods. However, the widely diverse technical problems and requirements of the commercial firms located within TAC's geographic region demand certain selective augmentations of the NASA bank. Therefore, TAC is investigating other sources of information to supplement its current information base.

FACULTY CONSULTATION

The University of New Mexico (including the new School of Medicine) is made up of close to 60 academic departments. Its enrollment (April 1967) is approximately 12,000. Full-time faculty members total 498, with 345 of them possessing doctorates. The University is community-, state-, and nation-conscious and is involved in a wide variety of vital programs in addition to the purely academic.

When the need arises, TAC can tap a large reservoir of resources because of the presence of the University. The most significant is the cooperation between TAC staff members and University faculty and staff personnel in dealing with complex and urgent problems and requests.

IV. Organizational Structure

The Technology Application Center is organized into two sections--Applications Engineering and Information Services. Each is described below.

The Applications Engineering section is so organized as to provide (1) a minimum number of Senior Engineers, each of whom is responsible for specific customer accounts on either a geographic or an industrial basis or both; (2) a cadre of Applications Engineers who provide the Senior staff with specific engineering knowledge in their respective disciplines; and (3) Engineering Assistants, who usually possess a level of academic proficiency comparable to that of the second group but who lack the same level of experience.

Information Services has two distinct functions--providing information services and developing internal systems--and is organized accordingly. The information division maintains the Center's library, processes all forms of paper work, maintains the information bases, produces specialized bibliographies, and provides consultation regarding the library aspects of TAC operations.

Internal-System Development (the second function of Information Services) is responsible for developing procedures for handling internal documents and for devising and improving manual and computerized retrieval systems. This division gives first consideration to the development of equitable pricing measures, effective working standards, efficient scheduling, and the most productive work procedures.

V. Services

The Technology Application Center currently provides its industrial clients with five separate, distinct, and continuing services. The five major services are Retrospective Search (RSS), Selective Dissemination (SDS), Industrial-Applications Reports (IAR), the COSMIC Program, and Referral.

RSS

Retrospective Search consists of a computerized search of TAC's aerospace-related literature designed to find documents applicable to a specific and well-defined technical problem. The output to member companies consists of abstracts of documents carefully selected as most relevant. Hard copies or microfiche of the entire documents are obtained by TAC if a member company so requests.

SDS

Selective Dissemination is a service that provides a semimonthly computer screening of all new documents pertinent to each member company's scientific- and technical-interest profile. TAC staff engineers review for relevancy each computer-retrieved abstract, forwarding only those directly supporting a specific company's profile. Hard copies or microfiche of such abstracts are also provided upon request.

IAR

The service supplied through Industrial-Applications Reports is a semimonthly mailing to member firms of several announcements of technical innovations identified by TAC personnel as potentially applicable to commercial use.

COSMIC PROGRAM

The Technology Application Center provides all its interested member firms with announcements from the University of Georgia's COSMIC Program--a service set up to make NASA-developed computer programs available to industry. TAC's dissemination of such announcements resulted from a sample survey of member firms that demonstrated their interest in and anticipated use of computer programs already developed.

REFERRAL

Through its referral services and as part of its regional responsibilities TAC provides additional benefits to technically oriented firms in the Center's region. Referral aid can include using TAC's official position to arrange loans from special library holdings, telling a client about unique testing facilities located within the region, or acting as a liaison agency to bring a client into beneficial and necessary contact with technical specialists or research scientists capable of giving advice on especially difficult or unique problems.

A more comprehensive statement of TAC's standard services has been published in the Center's brochure which can be obtained from the Center.

VI. Specific Programs

GENERAL

Three major comprehensive and significant programs are the focal points of TAC operations during the five-year period under consideration: the Regular Dissemination Program, the Small-Business Program, and the Natural-Resources Program. The Center will emphasize the extension and improvement of these three areas of activity during the next five years.

Each of the formal Programs is sufficiently different from the other two to give it its own distinctive objectives; yet all three are integrated into the total Center structure. Therefore, the benefits accruing to and the findings resulting from any one of the three are shared by the others.

A fourth division of TAC activities--important, but not yet so basic as the other three--is a series of Special Programs encompassing TAC efforts to develop and extend mutually beneficial working relationships with all government and private organizations engaged in transferring technology and dissemination technical information.

REGULAR DISSEMINATION PROGRAM

The Regular Dissemination Program is the major TAC effort and is aimed at meeting the needs of all regional firms with widely ranging technical activities. Its aims are: (1) to educate Members in their need for and use of externally generated information; (2) to promote regional economic growth and health by the transfer of technology; (3) to gain from industry increasing financial support for TAC's services; and

(4) to encourage expanding interaction between TAC and the scientific, the technical, and the industrial communities. In addition, TAC attempts to implement any special services becoming obviously desirable as the Center broadens its contact with and knowledge of regional companies and organizations.

Members of the Regular Program receive TAC's broadest amd most sophisticated services--primarily Retrospective Search and Selective Dissemination.

One characteristic of TAC's Regular Dissemination Program is worthy of special comment because it distinguishes the TAC service from services rendered by most other Regional Dissemination Centers. TAC expends much effort establishing a person-to-person working relationship with the technical staff of each member firm. Throughout the tenure of an associate membership TAC engineers maintain direct channels of communication with engineers and scientists of each member firm--personal visits and frequent telephone conversations.

SMALL-BUSINESS

In most instances Regional Dissemination Centers have focused their attention upon serving medium-sized and large firms, so that small businesses--despite their vast potential for development--have not benefitted as fully as they might. TAC's program for Small Business is an expanding and continuous attempt to educate both the Center and the poeple in so-called "small" businesses in the science of the economic use of available information.

Carrying on this particular Program gives the Center an opportunity to study (1) the conditions motivating a small firm to seek information,

(2) the types of information needed by small firms, and (3) the ways in which such information is used. The lessons learned enable TAC to devise more effective small-business methods and aids.

NATURAL-RESOURCES

The Natural-Resources Program is a program of the accumulation, the organization, the transfer, and the dissemination of scientific data and technical information on the improvement and development of extractive industries and disciplines; i.e., agriculture, forestry, mining, hydrology, petroleum mining, oceanography, and geography. The Technology Application Center has identified the data and the information in the NASA base that are available to such industries and disciplines. The program is experimental and therefore unlike the Regular Dissemination Program in at least three respects: (1) it represents a continuing effort to identify new or projected NASA offices, programs, projects, and missions that generate (or will generate) data not effectively retrievable from the NASA base or the Technology Utilization Program (2) it tries to identify special NASA facilities or other facilities handling natural-resources information and data and to tap their storage-retrieval systems; (3) it conducts a continuing study of potential users of information on natural resources, because the spectrum of utility has been proven to be much broader than is immediately apparent.

SPECIAL PROGRAMS

Special Programs cover several separate but related activities concerned with the cooperation between TAC and other government-sponsored technology transfer programs. These are primarily programs of the Office of States Technical Services of the Department of Commerce.

In New Mexico

The close cooperation between TAC and the States Technical Services Program in New Mexico was insured from the outset because both programs are organizationally responsible to the Bureau of Business Research at The University of New Mexico. Equally important is the policy (adhered to by both directors) of avoiding duplication of activities and making every appropriate exchange of aid possible. Now being negotiated is an agreement within which TAC will provide technical information to support Technical Services field-engineering services and special seminars. Other cooperative activites are being planned.

In Texas

A slightly different but equally valuable association is evolving with the Technical Services program in Texas. Because of previous experience and parochial loyalties, many large and medium-sized Texas firms prefer the information services of Texas institutions. Therefore, TAC has proposed joint programs to the two key Technical Services facilities charged with the major information-dissemination effort in Texas. One of them, the Science Research Library of Southern Methodist University, has accepted the joint program concept and negotiations are currently under way on a formal agreement.

In the Rocky Mountain Region

Under the sponsorship of the Federation of Rocky Mountain States, Inc., a committee has been established to explore regional cooperation under the States Technical Services Act. Members on the committee include representatives from New Mexico, Arizona, Utah, Colorado, Wyoming, Idaho, Montana, and Nevada. TAC has worked with this group and is hopeful of being included in the regional program which may evolve.

With Other Programs

The Office of Industrial Cooperation (OIC) program of the Atomic Energy Commission is planning to establish an OIC at Sandia Corporation in Albuquerque possibly beginning in Fiscal Year 1968. TAC has worked closely with Sandia in their development of their program proposal and is planning a joint effort with Sandia when their OIC becomes operational.

VII. The Five-Year Goals of the Technology Application Center

GENERAL

To facilitate an increasingly effective and timely transfer of new technology to commercial firms of the Rocky Mountain-Southwest, TAC is continuously attempting to improve all the major facets of its operations. Some of the most important elements of this effort and their intended effect upon the Center's capabilities are discussed in this section.

Regular Dissemination Program

The Regular Dissemination Program will be continued as the backbone of the Center's operation. As such, it is aimed at achieving eventual self-support. This economic self-sufficiency remains a paramount goal, to be achieved through fees from clients. To accomplish this goal, TAC is attempting to follow a time-tested formula for success: "Find the need; then serve it well." Thus the Center will continue to try to understand more precisely the informational needs of clients and prospective clients, individually and collectively.

Recognizing its primary role as a service organization, TAC diligently seeks to make prospective clients fully aware of all its services. When a prospect becomes an active member, TAC will endeavor to learn as specifically as possible why the firm joined and the relative weights of its motivations. This information will aid TAC in making certain that client expectations are met as fully as possible, improving generally the efficiency of future technology transfer. TAC will also continue

its consultation with the benefitting engineers to insure early awareness of service deficiencies. When a prospect declines to join the Center, attempts will be made to determine the real reason. Whenever possible, TAC will obviate that reason and learn from it.

Recent experience has indicated that several areas of TAC services need improvement. We have become aware, for instance, that in some technological fields our information base lacks sufficient depth and breadth, and that our response time on searches is too long. Partial solutions to these problems have already been implemented, and other improvements are scheduled. These are outlined below under BASIC OPERATIONS.

Another important factor sure to exert an increasing impact on the success of the Center's Regular Dissemination Program is the proliferation of competitive Information Centers and Technical-Service Organizations with services exactly like or partially duplicating our RDC offerings. The existence and availability of these competitive services are becoming more and more apparent to clients and prospective clients, and TAC plans to meet the problem directly during the next five years. The Center's approach will be to increase its emphasis on its professional excellence in products and services and to develop for the region a composite information base and "stable" of services that can be matched only through a client's membership in a combination of several other centers.

Small-Business Program

Although by TAC's assessment the small-business firms of this region possess a vast potential for development, they have not yet benefitted adequately from technology-utilization programs. Consequently, the Center's experimental Small-Business Program is geared directly to

developing a variety of flexibly responsible transfer mechanisms, which can effectively adapt the Center's information base and normal services to whatever unique problems are found within the small technical companies. When patterns or similarities of need can be isolated, proven service procedures will be determined and standardized; however, emphasis will remain on identifying the technical needs of each small firm and effectively meeting those needs. Inherent in this process will be TAC's continuing efforts to stimulate the management of such small businesses to an awareness and consideration of new technical ideas or innovations that can benefit their operations.

Regarding previous Center efforts of this nature, one significant deficiency assessed by several small firms has been the too-high level of sophistication of much of the material in the NASA base. TAC proposes to overcome this problem during the five-year period by: (1) identifying, selecting, and assembling from the NASA base the information considered most pertinent to the majority of small businessmen (such as process information, shop practices, handbooks, manufacturing characteristics, metal-working tips, and other documents written at the lower levels of technical sophistication); (2) supplementing the NASA base with similar information from other available sources; (3) providing limited on-site engineering interpretation of pertinent published documents; and (4) providing a referral service that can put the small businessman and his needs in direct contact with appropriate regional consultants.

Natural-Resources Program

TAC is convinced that the Natural-Resources Program possesses almost unlimited possibilities for the growth of and value to a large variety of logical users. Because of the rate of population increase the earth's

natural resources must be detected, inventoried, and used with increasing efficiency. Fortunately, the timing and the availability of space-age advances in remote sensing and earth-imagery technology are such that useful data-collection systems already exist. Although improvement is expected in all major elements of these earth-data collection systems during the next few years, currently available information already warrants a trial effort in data utilization by the extractive industries. Also, as such a program is developed, whole categories of potential users not yet identified will certainly be found.

TAC proposes a rather ambitious but fully realistic program for the next five years. It is designed to provide the stimulation, the motivation, and a partial means by which commercial firms interested in natural resources are brought into effective contact with available data and with the broad promise of the future. Through this program TAC intends to work directly with client firms to aid in evolving methods of interpreting and using earth data fully and, concurrently, to provide feed-back and recommendations for improving data-gathering techniques. Such commercial use should give depth and balance to the continuing related efforts under direct government sponsorship. Fees from user firms will support an increasingly significant portion of the costs of developing, experimenting with, and operating a Center for these purposes.

Continuing and additional objectives of the natural-resources experimental program are several:

1. TAC must continue to identify potential users of its services. With the acquisition of more data, both qualitative and quantitative, the variety of such users will expand. Many may be small or peripheral; some will develop into categories of larger size and potential.

2. The Center must keep abreast of current and future developments. TAC realizes that the entire range of natural-resources data resulting from current research and development (R&D) effort and applicable to potential users has not yet been completely identified and that new data are continuing and will continue to become available, representing a genuinely important potential for commercial use.

3. The Technology Application Center must strive to disseminate the greatest amount of data as efficiently as possible. Therefore, it plans to continue its survey of the existing natural-resources market in order to identify and evaluate several vital factors: (1) the awareness of potential users regarding the available NASA and other government-related R&D in the natural-resources field; (2) previous and present difficulties of potential users seeking such information; (3) the complete range of natural-resources data and the information applicable to potential users; (4) the use made of available R&D by the potential users so far; (5) the willingness of such users to pay for services of dissemination; and (6) efficient method or methods of promoting the economic applications of natural-resources data and information.

Special Programs

1. With States Technical Services Programs.--During the five-year period TAC plans to continue developing and making more effective its cooperation with States Technical Services Act (STSA) programs in the Rocky Mountain-Southwest.

An agreement will be concluded with the STSA program in New Mexico. It will call for TAC support of the New Mexico Field Engineering effort and special seminars, and it is envisioned that TAC will become the technical information source for the total program in New Mexico.

An agreement will be concluded with the Texas STSA dissemination activity at Southern Methodist University. Through this agreement TAC will provide the industrial clients of the STSA program at the Science Research Library of SMU with the full spectrum of TAC search services. Combining TAC's computer-oriented retrieval service with the well developed library service of SMU should provide an information package that is more flexible than that provided by either organization separately.

Also during the five-year period, TAC will continue to work with the Technical Services Act committee of the Federation of Rocky Mountain States, Inc. This committee is developing a regional program for the Rocky Mountain States and TAC intends to become part of this program as it evolves.

2. With AEC's Office of Industrial Cooperation.--Another Special Program that TAC plans to develop as fully as possible during the next five years is a cooperative effort with the Office of Industrial Cooperation planned for implementation at Sandia Corporation. This cooperative effort is expected to make more effective the dissemination of AEC technical information and Sandia Corporation technical expertise to TAC members.

3. New Experimental Program.--A third Special Program to be initiated during the five-year period will be a research project to shed light on regional factors that influence technology transfer. The ultimate purpose of this research will be to form a foundation for future improvements in technology transfer in the TAC region. During the next year the Center will define the variables of greatest apparent interest and will submit

the research design that will be used for the investigation. Subsequent years will be devoted to data collection, reduction, and documentation. The final phase of this program will be to propose, based upon substantial findings, an improved regional information dissemination program.

BASIC OPERATIONS

General

Service is the single most important and essential ingredient in TAC's product package for its clients. Providing up-to-date, responsive, professional attention to the technical problems of commercial firms is recognized as a valuable and marketable element of that service. So, also, are the speed, efficiency, and relative economy of conducting literature searches with modern computer techniques. Without a highly developed ability to provide such services (and to improve them), the Center would lack viability and would fail to achieve its potential. Recognizing these realities and feeling a keen desire to play a rewarding role in regional development, the Center has selected six major goals for the program period.

1. Development of an Improved and More Rapid Response to Client Needs.-- The total time elapsing between client request and TAC response has been steadily decreased, as the Center has gained operating experience; however, this trend is now leveling off at a length of elapsed time that is still far too long. Further tightening of TAC procedures can provide only slight improvement. The major residual problem is the unacceptably long delays caused by having computer-search services provided at a remote installation (now at ARAC, University of Indiana).

Establishment of computer-processing services at TAC has already been studied and shown feasible in a previous report ("Computer Feasibility Study" of 1 April 1967). Such facilities at TAC will greatly improve the

Center's ability to respond properly to client needs. Implementation plans are amplified below. After implementation, improvements in programming and strategy that will enhance search effectiveness, speed of response, and versatility of accession will be continuing goals throughout the program period.

2. Development of a Greater Breadth and Depth of Information-Base Coverage.-- Notwithstanding the current excellence and continuing rate of improved expansion of the NASA information base, its predominant wealth is in the field of aerospace-related sciences and technologies. Experience with both clients and potential clients makes increasingly clear the fact that this breadth of coverage is by itself inadequate to satisfy some of the priority needs of these firms.

TAC recognized this problem early in its development and has sought to alleviate it by augmenting the NASA information base through use of additional information sources such as Geoscience Abstracts, Nuclear Science Abstracts, U.S. Government R&D Reports, etc. Tapping some of these sources has improved the Center's service to and acceptance by client firms. However, the current inefficiencies and excessive costs of the manual searching of these sources seriously limit the Center's use of them. At an accelerating rate these other information banks are becoming available in machine-searchable forms (i.e., Chemical Abstract Tapes), which can render their extensive use both practical and timely. TAC seriously believes that the increasingly broad acceptance and most effective use of the NASA information bank by commercial industry can best be achieved when the information is marketed in conjunction with these complementary sources of technical information.

Concurrently, the Center's overall effort to extend its information base beyond the NASA bank will include a concerted attempt to identify and to make available those types of information that best lead to acceptance and innovation on the part of the small businessman.

As an additional important part of its five-year program of development TAC is engaged in broadening its available resources by continuing to search out, to categorize, and to evaluate each new "Technical Information Service" and "Speciality Center", as they proliferate across the country. TAC plans to seek arrangements whereby the Center can when necessary draw upon the holdings of specialized federal information banks of the Department of Defense, the Department of Commerce, the Bureau of Standards, etc.

3. Development of Improved Communication Facilities and Referral Services.-- To speed response and to enhance the value of its technical services to the region, TAC plans to participate in a multistate teletype network, which will efficiently link the sprawling elements of this sparsely industrialized region into a composite body for mutual aid, consultation, and referral on all technical matters. Through this network the benefit of NASA-developed technology can be brought to bear more rapidly upon regional problems. Also, as more regions develop similar teletype systems, TAC plans to link with them and eventually with whatever national networks evolve. In the interim TAC will seek to establish procedures providing contact via teletype with technical centers and other nation-wide organizations that have both proper terminal equipment and a potential for aiding the Center.

Additional benefits are planned for technical firms of this region through an expanded and improved referral system to be implemented by TAC. Continuing as one source of expertise will be the Technology Utilization

Offices of the various NASA Centers. TAC also plans to develop a closer consulting and referral relationship with each specialized materials-and-technical center of the Department of Defense and other federal agencies. Appropriate private centers of similar expertise across the country will also be approached; and their referral participation elicited.

To develop TAC further as the focal point for finding solutions to technical-information problems within its region, TAC plans to cooperate with other regional organizations in assembling and making available for ready reference gross inventories covering all major technical resources of the region, including human specialists, special library collections, unique testing facilities, etc.

4. Development of an Increased Cost-Effectiveness for Center Services.--To an increasing extent within the next five years each element of the Center's operations will be continuously scrutinized as to its essentiality, cost, and relationships to other elements. Such incisive attention will be given to the basic mechanics of acquiring, storing, searching, and reproducing documents and also to the Center's investments of professional time and resources in the more intangible areas of selecting, evaluating, consulting on, and marketing the contained information. Administrative, clerical, and supply functions will also continue to be measured, tailored, and reorganized as necessary to insure responsiveness and flexibility in carrying out the Center's evolving mission.

As an example of an area ripe for improvement, additional technical-information banks exist (as has been noted above), which can complement and augment NASA's. They are becoming increasingly available in machine-searchable forms. TAC's current efforts to serve its clients by conducting manual searches of these banks are inefficient and costly and will be

replaced as soon as possible by computer accession to their contents. Efficiencies resulting from such changes will speed and broaden TAC's services and will also make the talent so released available for efforts to increase the marketing effort, to study more thoroughly the technology-transfer mechanism, or to provide personal consultation to clients.

5. Increasing the Scope of the Technical Evaluation and Summary Services Available to Clients.--Rapid, selective availability of pertinent technical literature, whether in response to specific interest profiles or as an aid in solving problems, is recognized by most technically oriented firms as a very valuable service. For some types of clients the addition of synoptic comments covering the merits, currency, and completeness of a package of abstracts resulting from a search can be at least equally as valuable as the search itself.

A second service desired by some clients is the actual technical evaluation and summarization of the contents of the major technical literature identified by each search. Although TAC plans a genuine effort to increase the scope of its services, the large investment of highly skilled human resources necessary to provide such evaluation and summarization forces upon that service a relatively low priority until late in the programmed period.

6. Computerized-Retrieval Service.--Justification for and the details involved in initially implementing computerized retrieval capability at the Center itself have been covered elsewhere in this document, as well as in separate studies previously furnished NASA. Briefly, the first year will be devoted to establishing a computerized retrieval-and-processing ability. Efforts will be focused upon (1) implementation of an initial retrieval stratagem, (2) experimentation with dissemination based upon

extended computer output, (3) investigations of the feasibility of employing advanced hardware and software to bring TAC's systems and services to their highest efficiency, and (4) investigations of the feasibility of accommodating requests for computerized access to other specialized information banks.

The Center proposes to continue during the second year its studies and programming efforts to improve its data-processing system so as to provide the best service at the lowest cost possible. Also, when computerized-retrieval services are found to be feasible, a full-scale retrieval service will be implemented. Additional computer-based programs to serve the unique needs of the region's STSA users, its natural-resources community, its small businesses, etc., will be implemented, as requirements become better defined.

The Center proposes to engage in rigorous evaluations of its computer-based programs in the latter part of the five-year period, with the intention of postulating and testing improved methods of information retrieval and dissemination. Guided by technological developments and the needs of the market, the Center expects its continuous evolution to result in superior systems and services.